Adjunctive application of a muscle pump activator to improve blood flow in patients with lower limb ulcerations related to chronic venous insufficiency

Michele Suitor RN, MN, NP
and Ambulatory Wound Team, WestView Health Centre, Stony Plain, Alberta

Introduction
The calf muscle pump generates high pressures that assist in venous blood return against the force of gravity. 1 “Near muscle-electrostimulation (NMES) is the common peroneal nerve activates the calf and foot muscle pumps. This in turn increases venous, arterial and microcirculatory blood flow in the lower limb; reduces edema and promotes conditions to support wound healing. The effect of applying electrical muscle pump activation on wound healing in patients with chronic venous insufficiency and delayed wound healing beyond expected trajectories despite optimized graduated compression therapy and best practice wound management is examined.”

Procedure/Method
The muscle pump activator device was applied to three ambulatory wound clinic patients with mixed etiology lower extremity wounds. The geko™ muscle pump activator device was applied to all wounds except for an extremity wound. The device was applied to the patient during a time of their daily routine of greatest activity. This was done until wound closure was achieved and for up to one month following to help ensure a more robust healing after closure.

Findings/Results
Wound healing outcomes were found to be improved over standard care with all wounds attaining full closure. Each patient demonstrated an individualized pattern of wound healing; however, healing times were expedited compared to baseline, once the muscle pump activation system was initiated. All patients remained healed one month after the device trial was completed. Secondary findings included a reduced lower leg edema, improvement in subjective pain, a softening of woody fibrosis and an improvement in skin color.

Implications/Applications
The development of adjunctive technologies provides the opportunity to better address health concerns and promote positive patient outcomes. Lower extremity wounds are a challenge to the patients’ who live with them and to the health care teams developing a treatment plan. Use of a NMES provides another valuable tool in the wound healing toolbox.

References

Case 1
A 67-year-old man with history of mild chronic venous insufficiency and surgical removal of bilateral great toe bone ends (September 2015). The patient developed infection and cellulitis on the left lower leg over the common peroneal nerve. The patient was initially treated with intravenous antibiotics and oral doxycycline. The patient demonstrated a delay in wound healing, with intermittent signs of infection. The patient was treated with the geko™ muscle pump activator device (December 15th). The patient applied the device to each leg 5 days a week, 6 hours per day with only minor skin irritation that settled during the evening. The patient demonstrated a reduced lower leg edema, subjective presence of a reduced pain level, a softening of woody fibrosis and a fading of her hemosiderin staining to a lighter brown. Subjectively the patient stated her legs were much less swollen and her pain was less when she used the device.

Case 2
A 67-year-old man with Type 2 diabetes and recurrent foot complications. History includes atrial fibrillation, angina and history of smoking. The patient was referred for wound care and received the geko™ muscle pump activator device (December 29th, 2016). The patient developed bilateral foot ulcers in March 2016. The patient was treated with a variety of therapies including: foot care, compression, antibiotics, and biologic debridement. The patient experienced recurrent local infection with intermittent wound improvement and deterioration despite best practice wound care, maintenance debridement and triple antibiotic compression. Adjunct therapy with PulsePlyte® patching was added in May 2016. APHs: (R) 1.1 (L) 1.1. Sept 29th, 2016.

Call Procedure:
geko™ muscle pump activator device was initiated December 15th. The patient applied the device to each leg 5 days a week, 6 hours per day with only minor skin irritation that lasted during the evening. Full wound closure was achieved in 2 weeks with the geko™ device continued one month following. Findings: Secondary findings, included healing of necrotic tissue, an improvement in skin color; a reduction in edema; a softening of woody fibrosis. The patient was very pleased to have finally healed this very difficult to manage wound.

Case 3
A 57-year-old woman with type 1 diabetes and recurrent foot complications. History includes atrial fibrillation and advanced chronic venous insufficiency. The patient was non-compliant with compression and foot care. The patient was discharged with intermittent wound healing and underwent treatment with appropriate H antibiotics for 4 weeks. During those four weeks to both cali legs, developed non-healing with moderate bilateral lower leg and foot ulcers. APHs: (R) 1.1 (L) 1.1. Pedal venous testing 10/10 bilaterally.

Call Procedure:
geko™ muscle pump activator device was initiated December 29th, 2016. The patient applied the device to each leg 5 days a week, 6 hours per day with only minor skin irritation that lasted during the evening. Full wound closure was achieved in 2 weeks with the geko™ device continued one month following. Findings: Secondary findings included healing of necrotic tissue, an improvement in skin color, and intermittent infection/cellulitis for over 8 years. Her right leg was especially problematic and required debridement as healing was stalled. The patient applied the device to each leg 5 days a week, 6 hours per day with only minor skin irritation that lasted during the evening. Full wound closure was achieved in 2 weeks with the geko™ device continued one month following. Findings: Secondary findings included healing of necrotic tissue, an improvement in skin color, and intermittent infection/cellulitis for over 8 years. Her right leg was especially problematic and required debridement as healing was stalled. The patient applied the device to each leg 5 days a week, 6 hours per day with only minor skin irritation that lasted during the evening. Full wound closure was achieved in 2 weeks with the geko™ device continued one month following. Findings: Secondary findings included healing of necrotic tissue, an improvement in skin color, and intermittent infection/cellulitis for over 8 years. Her right leg was especially problematic and required debridement as healing was stalled. The patient applied the device to each leg 5 days a week, 6 hours per day with only minor skin irritation that lasted during the evening. Full wound closure was achieved in 2 weeks with the geko™ device continued one month following.